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Research Article

Prevalence of malnutrition in a tertiary hospital in Turkey: overlooked subject?

Abstract

Aims: The study evaluated children's nutritional status at the moment of hospitalization.

Patients and Methods: The nutritional status of 113 hospitalized patients was retrospectively evaluated at the time of hospitalization in the Clinic of Pediatric Gastroenterology between May 2013 and November 2014. During hospitalization, height for age, weight for age, and weight for height z scores were calculated.

Results: Of the 113 patients in the study, 58 were female and 55 were male; the mean age was 59.59 ± 61.73 months and 67.87 ± 60.99 months, respectively. According to the World Health Organization standards, 33 (29.2%) underweight patients, 17 (15.0%) patients with acute malnourishment, and 21 (18.6%) patients with chronic malnourishment were detected. Based on weight for age data, 10 (8.8%) patients were severely malnourished, 22 (19.5%) patients were moderately malnourished, 27 (23.9%) patients were mildly malnourished, 40 (35.4) patients had normal weight, 8 (7.1%) patients were overweight, and 6 (5.3%) patients were obese. According to the Water low classification, 14 (12.4%) children were stunted, 6 (5.3%) children were wasted-stunted, and 15 (13.3%) children were wasted.

Conclusion: High rates of malnutrition were detected in hospitalized patients, therefore nutritional status should be carefully assessed at the moment of hospitalization to reduce the mortality rate, and patients should be given immediate nutritional support. The early diagnosis of mild or moderate malnutrition, and the timely start of treatment, will diminish the progression to severe malnutrition in developing countries like Turkey.

Introduction

Malnutrition is a condition characterized by a deficiency or excess intake of nutrients, or an imbalance of nutrients that has adverse effects on growth and development, and may increase morbidity and mortality. This term also includes obesity [1]. Malnutrition is reported to be directly or indirectly responsible for about 50–60% of childhood mortality worldwide [2]. The prevalence of malnutrition in hospitalized children has been reported as 5% in developed countries and up to 50% in developing countries [3-5].

The prevalence of malnutrition in hospitalized children has not decreased over the last 20 years [6]. Therefore, the Committee on Nutrition of the European Society for Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) has recommended the establishment of a nutritional support unit, especially in children's hospitals; the implementation of nutritional risk screening and providing adequate nutritional management to identify patients who require nutritional support; and the education of hospital staff and checking them regularly [7]. However, these recommendations have not been widely introduced into clinical practice.

While severe malnutrition is easily diagnosed, the diagnosis of mild or moderate malnutrition is often overlooked. Diagnosing mild or moderate malnutrition in the early period of hospitalization and starting treatment will diminish progression to severe malnutrition, so that the morbidity and mortality risk of malnutrition will be reduced. To our knowledge, this is the first study on the prevalence of malnutrition in hospitalized children in the Clinic of Pediatric Gastroenterology. The aim of our study was to determine the prevalence of malnutrition at the moment of hospitalization in patients.

Methods

Children hospitalized in the Clinic of Pediatric

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Gastroenterology (tertiary center in Turkey) between May 2013 and November 2014 were included in the study. They were evaluated retrospectively from their records.

Patients who were admitted to intensive care or the emergency department were excluded and patients who were readmitted after discharge were excluded. Patients were also excluded if they were hospitalized for less than two days; had a history of premature birth or low birth weight; had congenital syndromes, such as Down syndrome, or oncologic diseases or chronic renal failure; or had no records of measurement of height and weight.

Anthropometric measurements are important in determining the risk of malnutrition in children in the early period of hospitalization. Therefore, measurement of the height and weight of newly hospitalized patients is required to calculate the necessary anthropometric values. On admission, the body length of children under the age of 2 years, standing height from the age of 2 years, and body weight were measured.

Multiple factors, such as low socioeconomic and educational level of the parents contribute to the development of malnutrition. Because of that, we used the socioeconomic and educational level of the parents.

We used different classification systems for the defining of malnutrition; Gomez classification, Waterlow classification and World Health Organization 2006 classification.

According to Gomez classification, > 90% of the median of gender specific reference values of weight for age of this population were considered to indicate normal, 75–89% indicate mild malnutrition, 60–74% to indicate moderate malnutrition, and values <60% were defined as severe malnutrition [8].

Malnutrition was defined according to the criteria established by Waterlow. That is, 81–90% of the median of gender specific reference values of weight for height of this population were considered to indicate mild malnutrition, 70–80% to indicate moderate malnutrition, and values <70 % were defined as severe malnutrition [9].

Because there is a controversy in identifying malnutrition worldwide, the World Health Organization (WHO) has recommended the use of three indices; height for age z score (HAZ); weight for age z score (WAZ); and weight for height (W/H) z score [10]. The HAZ indicates the linear growth retardation among children; -2 SD is the median reference value according to the population, and a < -2 z score indicates chronic malnutrition. The WAZ is used to assess both acute and chronic malnutrition, and for the long-term evaluation of nutrition; a < -2 z score is referred to as underweight. A W/H z score (especially in children under the ages of 24 months) is used to identify children below -2 SD. Those below these values are accepted as weak (wasted), which is an indicator of acute malnutrition [10]. Based on the WHO classification for malnutrition, children with < -3 z scores for W/H or H/A were considered to be severely malnourished (including severe wasting and severe stunting) [11]. Those with W/H or HAZ between -3 and -2 were classified as moderately malnourished.

In April 2006, the WHO reported new standards for assessing the nutritional status of children under the ages of 5 years. These criteria have been developed in Europe, Africa, the Middle East, Asia, and Latin America and can be used internationally [12]. Children who have z scores between -1 SD and 2 SD are no longer considered as malnourished according to the WHO criteria [13].

In the present study, weight for age (W/A), H/A, W/H, WAZ, and HAZ were calculated separately using the WHO 2006 standards. In addition, the Gomez and Water low classifications were used to assess the nutritional status of the patients in our study.

Statistical analysis

The Mann-Whitney U-test was used for the comparison of groups of numerical variables. The relationships between categorical variables were analyzed using the chi-squared test. A level of $p < 0.05$ was considered as statistically significant. The SPSS for Windows 22 software package was used in the analysis.

Results

Of the 113 patients in the study, 58 (51.3%) were female, 55 (48.7%) were male, and the mean age was 59.59 ± 61.73 months and 67.87 ± 60.99 months respectively. The demographic and anthropometric characteristics of the patients are shown in table 1. Malnutrition rates in relation to age groups are shown in table 2. Malnutrition rates in terms of the number of hospitalization days are shown in table 3.

Because the present study was retrospective, the data for breastfeeding and additional food given were obtained in only 90 (79.6%) patients; the mean time of breastfeeding and starting to receive additional food was 10.88 ± 9.41 months and 4.61 ± 3.33 months, respectively.

Table 1: Demographic and anthropometric characteristics of the patients.

	n (number)	mean ± SD (min–max)
Age (months)	113	63.84 ± 61.22 (2–180)
Height (cm)	113	100.58 ± 37.16 (50–177)
Admission weight (kg)	113	19.29 ± 15.67 (2.6–75)
Discharge weight (kg)	87	18.94 ± 15.32 (2.8–75)
Height for age (%)	113	95.58 ± 7.33 (70–113)
Weight for age (%)	113	87.20 ± 20.37 (39–138)
Weight for height (%)	113	93.03 ± 15.35 (59–138)
Weight for age z score	113	-1.28 ± 2.06 (-8.9–2.8)
Height for age z score	113	-1.08 ± 1.97 (-7.0–3.0)
Breastfeeding time (months)	90	10.88 ± 9.41 (0–42)
Beginning time of additional food (months)	90	4.61 ± 3.33 (0–18)
Duration of hospitalization (days)	113	12.44 ± 9.73 (2–52)
Hemoglobine	113	10.62 ± 2.38 (4.3–15.4)
MCV	113	79.77 ± 7.22 (61–98)
T.protein	113	6.47± 1.16 (3.1–8.5)
Albumin	113	3.81± 0.73 (1.6–5.1)

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In the current study, parents had low socioeconomic and educational level (Table 4).

According to the Gomez classification, 10 (8.8%) patients were severely malnourished, 22 (19.5%) patients were moderately malnourished, 27 (23.9%) patients were mildly malnourished, 40 (35.4) patients had normal weight, 8 (7.1%) patients were overweight, and 6 (5.3%) patients were obese (Table 2).

According to W/H data, 7 (6.2%) patients were severely malnourished, 16 (14.2%) patients were moderately malnourished, 26 (23.0%) patients were mildly malnourished, and 64 (56.6%) patients were of normal W/H.

With respect to the Waterlow classification, 14 (12.4%) children were stunted, 6 (5.3%) were wasted-stunted, and 15 (13.3%) children were wasted.

In regard to WAZ, 33 (29.2%) patients were underweight, 17 (15.0%) patients with were acute malnourished, and 21 (18.6%) patients were chronically malnourished.

According to HAZ, 8 (7.1 %) patients with a z score between -2 and -3 were moderately chronically malnourished, and 13 (11.5%) patients with a z score < -3 were severely chronically malnourished.

During hospitalization, enteral nutritional support was given to 22 (19.5%) patients, parenteral nutritional support was given to 3 (2.6%) patients, and both types of nutritional support were given to only 1 (0.9%) patient. The discharge weights of 87 (77.0%) patients were available: 56 (64.4%) of them had lost weight, 22 (25.3%) of them had gained weight, and 9 (10.3%) of them had no change in weight. Two of the 22 patients who have received enteral nutritional support gained weight, 17 of them lost weight, and 3 of them had not changed in weight. One of the 3 patients who had received parenteral nutritional support lost weight and 2 of them had gained weight. One patient who had both types of nutritional support gained weight. Thirty-eight of the 61 patients who had no nutritional support weakened, 17 (27.9%) of them gained weight, and the weight of 6 (9.8%) of them did not change. There was no significant difference between patients with and without nutritional support in terms of weight change ($p > 0.05$).

Table 2: Malnutrition rates in relation to age group.

	Groups (months)		
	<2 years	≥2 years	Total
number (n)	49 (43.4%)	64 (56.6%)	113 (100%)
Gomez			
severe malnutrition	8 (16.3%)	2 (3.1%)	10 (8.8%)
moderate malnutrition	11 (22.4%)	11 (17.2%)	22 (19.5%)
mild malnutrition	12 (24.6%)	15 (23.4%)	27 (23.9%)
Normal	18 (36.7%)	36 (56.3%)	54 (47.8%)
Waterlow			
severe malnutrition	5 (10.2%)	2 (3.1%)	7 (6.2%)
moderate malnutrition	7 (14.3%)	9 (14.1%)	16 (14.2%)
mild malnutrition	13 (26.5%)	13 (20.3%)	26 (23.0%)
normal	24 (49.0%)	40 (62.5%)	64 (56.6%)
WAZ			
< -2	25 (51.1%)	8 (12.5%)	33 (29.2%)
HAZ			
< -2	6 (12.2%)	2 (3.1%)	8 (7.1%)
< -3	10 (20.4%)	3 (4.7%)	13 (11.5%)

Abbreviations: W/A, weight for age; W/H, weight for height; WAZ, weight for age z score; HAZ, height for age z score.

Table 3: Malnutrition rates in terms of number of hospitalization days.

	Duration of hospitalization		
	≤ 4 days	≤ 4 days	Total
Number (n)	15 (13.3%)	98 (86.7%)	113 (100%)
Gomez			
severe malnutrition	2 (13.3%)	8 (8.2%)	10 (8.8%)
moderate malnutrition	2 (13.3%)	20 (20.4%)	22 (19.5%)
mild malnutrition	2 (13.3%)	25 (25.5%)	27 (23.9%)
normal	9 (60.1%)	45 (45.9%)	54 (47.8%)
Waterlow			
severe malnutrition	1 (6.7%)	6 (6.1%)	7 (6.2%)
moderate malnutrition	1 (6.7%)	15 (15.3%)	16 (14.2%)
mild malnutrition	6 (40.0%)	20 (20.4%)	26 (23.0%)
normal	7 (46.7%)	57 (58.2%)	64 (56.6%)
WAZ			
< -2	5 (33.3%)	28 (28.5%)	33 (29.2%)
HAZ			
< -2	-	8 (8.2%)	8 (7.1%)
< -3	1 (6.7%)	12 (12.2%)	13 (11.5%)

Abbreviations: W/A, weight for age; W/H, weight for height; WAZ, weight for age z score; HAZ, height for age z score.

Table 4: The demograhic features of the parents.

	Number (n=113)	Percentage (%)
Educational status of parents		
Illiterate	15	13.3
Primary school	18	71.7
Secondary school	7	6.2
High school	6	5.3
University	4	3.5
Income level of the family		
< 400 USD	75	66.4
400-700 USD	30	26.5
700-1000 USD	5	4.4
> 100USD	3	2.7
Legal domicile		
Country	85	75.2
Town	12	10.6
Village	16	

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In the evaluation of the patients in terms of sex, there was no statistically significant difference in age, height, weight, discharge weight, days of hospitalization, W/A, H/A, W/H, WAZ, HAZ, the mean time of breastfeeding, or beginning the additional food ($p > 0.05$).

Discussion

In the present study, according to the Gomez classification, 10 (8.8%) patients were severely malnourished, 22 (19.5%) patients were moderately malnourished, 27 (23.9%) patients were mildly malnourished. With respect to the water low classification, 14 (12.4%) children were stunted, 6 (5.3%) were wasted-stunted, and 15 (13.3%) children were wasted. Also, in regard to WAZ, 33 (29.2%) patients were underweight, 17 (15.0%) patients were acute malnourished, and 21 (18.6%) patients were chronically malnourished (Table 2). During hospitalization, enteral nutritional support was given to 22 (19.5%) patients, parenteral nutritional support was given to 3 (2.6%) patients, and both types of nutritional support were given to only 1 (0.9%) patient. The discharge weights of 87 (77.0%) patients were available: 56 (64.4%) of them had lost weight, 22 (25.3%) of them had gained weight, and 9 (10.3%) of them had no change in weight. Thirty-eight of the 61 patients who had no nutritional support weakened, 17 (27.9%) of them gained weight, and the weight of 6 (9.8%) of them did not change.

Exposure to negative factors, severe infections, especially during infancy when there is a significantly higher growth rate, may cause severe and permanent changes in growth and developmental processes and may cause malnutrition [14,15]. In a study conducted in Turkey in 2008, one in every 10 children under the age of 5 years was malnourished and one-third of them were severely malnourished [16]. The deterioration in nutritional status in our country begins in the first year of life, so early diagnosis and treatment of malnutrition is very important. Regarding age groups in the current study, the prevalence of malnutrition was 27.4% in the 0–24 month's age group. A high rate of detection of malnutrition in 0–24-month-old children is consistent with other studies [4,17-20].

Malnutrition is fairly common in hospitalized children regardless of the presenting symptoms. Malnutrition is often overlooked when coping with the child's main disease. Malnutrition rates vary depending on age and the underlying disease on admission to hospital [21-23].

The value of the protein-energy malnutrition in hospitalized children was reported as varying between 21% and 80% in proportion with the level of development of the countries [4,24-26]. There is an inverse relationship between the number of patients with malnutrition and the level of development of a country [5,27,28]. In developing countries, it is known that malnutrition has been one of the primary causes of mortality in children under 5 years of age [29]. Mortality in children with severe malnutrition is 8.7 times more than in non-malnourished children. The mortality risk is up to 4.2 times in mild malnutrition and two-fold in moderate malnutrition [30].

In the study by Cao et al. [6], nutritional support during hospitalization was given to 62.8% of the patients with severe malnutrition, 18.6% with moderate malnutrition, and 8.9% with mild malnutrition. In the study, 13.8% (183) of the patients were supported by parenteral nutrition, and 3.5% (46) were supported by enteral nutrition. No children received both. Additionally, 37.2% of the children with high nutritional risk were not supported by enteral or parenteral nutrition, but 8.9% of the children with low nutritional risk received nutritional support. The enteral nutritional support rate was found to be lower than parenteral nutrition support, which may be attributed to an incomplete assessment of nutritional status in this study. In another study, in which 346 (86.0%) of 402 children had their weight taken both on admission and at discharge, 37 had a nutritional intervention (all of them had enteral support) during their hospital stay [31]. Because a nutritional intervention influences weight at discharge, these children were disregarded for the analysis of weight loss during their hospital stay. Of the remaining 309 children, 100 (32.3%) lost weight during their hospital stay. It has been reported that only one-third of acutely malnourished children received nutritional support in the same study. In present study, during hospitalization, enteral nutritional support was given to 22 (19.5%) patients, parenteral nutritional support was given to 3 (2.6%) patients, and both types of nutritional support were given to only 1 (0.9%) patient. The discharge weights of 87 (77.0%) patients were available: 56 (64.4%) of them lost weight, 22 (25.3%) of them gained weight, and 9 (10.3%) of them had no weight change. No nutritional support was given to 14 (12.4%) patients who were moderately malnourished or 5 (4.4%) patients who were severely malnourished. In our study, in terms of weight change, there was no statistically significant difference between groups with and without nutritional support ($p > 0.05$). Our findings are consistent with the literature indicating that the incomplete assessment of nutritional status and hospital-related malnutrition is often overlooked when coping with the main disease.

It has been reported that the high-risk group for malnutrition have longer hospital stays [1,18,31-33]. In the current study, with respect to the duration of hospitalization and W/A, 53 (86.9%) patients with acute malnutrition were in groups with >4 days of hospitalization. In respect to the W/H data, 41 (83.7%) patients with acute malnutrition were also in groups with > 4 days of hospitalization. In regards to the duration of hospitalization and the HAZ data, 20 (95.2%) patients with chronic malnutrition were also in groups with > 4 days of hospitalization. There was no significant difference between the groups ($p > 0.05$) in terms of the duration of hospitalization. This is important in terms of the cost of prolonged hospital stay and also in regard to the increased risk of hospital-acquired infection during a longer stay, which may further exacerbate malnutrition [25].

It has been reported in multiple studies that the prevalence of acute malnutrition and chronic malnutrition is 10–71.2 %, and 7.7–21% respectively [17,26,31,33,34].According to studies conducted in different areas of our country, malnutrition rates in Turkey vary between 12–56.6% [19,23,35-37]. In our

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study, with respect to W/H, 49 (43.4%) patients had acute malnutrition; in regard to W/A, 59 (52.2%) patients had acute malnutrition; and in terms of the HAZ, 21 (18.6%) patients had chronic malnutrition. Our findings are consistent with the literature, but the rate of malnutrition is higher than in most of the studies. This rate may be attributed to the low socioeconomic level of our families and low educational level of the mothers. To our knowledge, although this is the first study on the prevalence of malnutrition in hospitalized children in the Clinic of Pediatric Gastroenterology, malnutrition was overlooked even by us while coping with the main disease.

Multiple factors, such as low socioeconomic and educational level, lack of food resources, wrong eating habits, frequent infections, and poor hygiene conditions lead to the development of malnutrition in Turkey. In the present study, parents had low socioeconomic and educational level (Table 4). This factors contribute to malnutrition. The most important factors of malnutrition in developing countries like Turkey are low socioeconomic and educational level.

Admission body weight and height records were reported in only 15.1–20.3% of the patients in different studies [3,17,32,38]. In one study, 346 (86.0%) of 402 children had their weight taken both on admission and at discharge [31]. In another study, discharge weights were available for 122 (76%) patients [18]. In our study, the discharge weights of 87 (77.0%) patients were available. Our study was compatible with these two studies. These reports showed that the measurement of weight and height, and evaluation of the malnutrition, was often overlooked in order to cope with the main disease. However, the findings of the studies also indicated that nutritional status is evaluated more and better in recent years.

It has been reported that the prevalence of being overweight and obesity in hospitalized children was 20.4–25% [18,20].The prevalence of overweight and obese children in our study was 12.4%. The difference between the studies may be explained by different economic levels and region. With respect to gender, the overweight/obesity rate was higher in girls in the current study, which is consistent with Aurangzeb et al.'s study [20].

The calculation of energy intake is considered to be a key part of nutritional assessment. Indeed, the deficiency of dietary intake, together with the increase of energy requirements, are the main causes of hospital malnutrition and may contribute to the worsening of malnutrition [39]. Poor nutritional status has been associated with higher rates of complications, an increased incidence of nosocomial infections, higher hospital costs, higher mortality rates, and longer lengths of stay in hospital [5,6]. These reports suggest that extra attention to nutritional status should always be given to the children in the high-risk group for malnutrition, and interventions should be started as soon as possible at admission.

There are some limitations of the present study. As it is a retrospective study, the discharge weights of some patients were not available. Because multiple factors such as underlying disease, disease duration and symptoms like vomiting, diarrhea affect the malnutrition rates, many patients were excluded from the study. So, we had a small number of patients.

The ideal screening tool should consist of a few easily obtainable data points, which might include both objective anthropometric parameters and subjective data points about disease state/food intake/nutrition history [39].

The incidence rate of malnutrition decreases with increasing socioeconomic levels and decreasing unemployment rates. In this regard, socioeconomic improvements are the first priority in the prevention of malnutrition. Malnutrition is still a serious problem in developing countries, such as our country, and early diagnosis and treatment is very important. Starting from infancy, the regular monitoring of the growth and development of each child during childhood is of utmost importance, especially to diagnose mild and moderate malnutrition. Health professionals working in primary health care institutions should be educated about nutrition and be required to raise the mother's awareness, encourage breastfeeding for the first six months alone, provide instructions for the transition to food and food selection, ensure regular monitoring of the healthy child, and teach housekeeping rules.

Conclusion

As a result of the findings of the current study, to prevent hospital-acquired malnutrition, the nutritional status of hospitalized children should be carefully assessed during hospitalization to identify mild and moderate malnutrition in early life. If malnutrition is detected, the patient should be referred to begin further investigation, and to start timely treatment to prevent progression to severe malnutrition.

References

1. Kruizenga HM, Tulder MWV, Seidell JC, Thijs A, Ader HJ, et al. (2005) Effectiveness and cost-effectiveness of early screening and treatment of malnourished patients. Am J Clin Nutr 82: 1082-1089. Link: https://goo.gl/2ahcFx

2. Pelletier DL, Frongillo EA Jr, Schrroeder DG, Habicht JP (1995) The effects of malnutrition on child mortality in developing countries. Bull World Health Organ 73: 443-448. Link: https://goo.gl/djNOye

3. O'Connor J, Yohde LS, Allen JR, Baur LA (2004) Obesity and undernutrition in a tertiary pediatric hospital. J Pediatr Child Health 40: 299-304. Link: https://goo.gl/bJiUEX

4. Hendricks KM, Duggar C, Gallagher L, Carlin AC, Richardson DS, et al. (1995) Malnutrition in hospitalized pediatric patients. Currrent prevalence. Arch Pediatr Adolesc Med 149: 1118-1122. Link: https://goo.gl/nVag7c

5. Tienboon P (1995) Nutritional status of pediatric patients: Maharaj Nakom Chiang Mai Hospital. Thai J Paren Enter 6: 3-14. Link: https://goo.gl/h0vfBB

6. Cao J, Peng L, Li R, Chen Y, Li X, et al. (2014) Nutritional risk screening and its clinical significance in hospitalized children. Clin Nutr 33: 432-436. Link: https://goo.gl/vkeS5y

7. Agostoni C, Axelsson I, Colomb V, Goulet O, Koletzko B, et al. (2005) The need for nutrition support teams in pediatric units. A commentary by the ESPGHAN Committee on Nutrition. J Pediatr Gastroenterol Nutr 41: 8-11. Link: https://goo.gl/4AuDCp

8. Gómez F, Ramos Galvan R, Frenk S, Cravioto Muñoz J, Chávez R, et al. (2000) Mortality in second and third degree malnutrition. 1956. Bull World Health Organ 78: 1275-1280. Link: https://goo.gl/MEQFx9

9. Waterlow JC (1972) Classification and definition of protein-calorie malnutrition. Br Med J 3: 566-569. Link: https://goo.gl/O1H5E3

Citation: Sahin Y, Goktepe AR, Ozen E (2017) Prevalence of malnutrition in a tertiary hospital in Turkey: overlooked subject?. Arch Clin Gastroenterol 3(2): 041-046. DOI: http://doi.org/10.17352/2455-2283.000037

10. World Health Organization (2007) Management of Severe Malnutrition: A Manual for Physicians and Other Senior Health Workers. Geneva: WHO, 1999. Link: https://goo.gl/9SgaJC

11. World Health Organization (2012) The WHO Child Growth Standards. Link: https://goo.gl/rg0zmP

12. World Health Organization (2010) WHO child growth standards: length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development. Geneva, Switzerland: World Health Organization; 2006. Link: https://goo.gl/wPL6tR

13. Joosten KF, Hulst JM (2008) Prevalence of malnutrition in pediatric hospital patients. Curr Opin Pediatr 20: 590-596. Link: https://goo.gl/Xj97xC

14. Chandra RK (199) Nutrition and immunology: from the clinic to cellular biology and back again. Proc Nutr Soc 58: 681-687. Link: https://goo.gl/76MKff

15. Brook CG, Hindmarsh PC, Healy MJ (1986) A better way to detect growth failure. Br Med J (Clin Res Ed) 293: 1186. Link: https://goo.gl/lZZt39

16. Ministry of Health (2012) Hacettepe University Institute of Population Studies. Turkey Demographic Health Surveys, 2008. Link: https://goo.gl/nR2lLC

17. Pawellek I, Dokoupil K, Koletzko B (2008) Prevalence of malnutrition in pediatric hospital patients. Clin Nutr 27: 72-76. Link: https://goo.gl/n5FtKp

18. Moeeni V, Walls T, Day AS (2013) Nutritional status and nutrition risk screening in hospitalized children in New Zealand. Acta Paediatr 102: e419-423. Link: https://goo.gl/wzW2bM

19. Ozturk Y, Buyukgebiz B, Arslan N, Ellidokuz H (2003) Effects of hospital stay on nutritional anthropometric data in Turkish children. J Trop Pediatr 49: 189-190. Link: https://goo.gl/J4wSJu

20. Aurangzeb B, Whitten KE, Harrison B, Mitchell M, Kepreotes H, et al. (2012) Prevalence of malnutrition and risk of under-nutrition in hospitalized children. Clin Nutr 31: 35-40. Link: https://goo.gl/dsGraq

21. Hankard R, Bloch J, Martin P, Randrianasolo H, Bannier MF, et al. Nutritional status and risk in hospitalized children. Arch Pediatr. 8: 1203-1208. Link: https://goo.gl/sBvNtd

22. Man WD, Weber M, Palmer A, Schneider G, Wadda R, et al. (1998) Nutritional status of children admitted to hospital with different diseases and its relationship to outcome in Gambia, West Africa. Trop Med Int Health 3: 678-686. Link: https://goo.gl/g55aUh

23. Doğan Y, Erkan T, Yalvaç S, Altay S, Cokuğraş FC, et al. (2005) Nutritional status of patients hospitalized in pediatric clinic. Turk J Gastroenterol 16: 212-216. Link: https://goo.gl/J9ek38

24. Tienboon P. Incidence and spectrum of malnutrition in pediatric wards. Thai J Pediatr. 1985; 24: 20-6.

25. Leite HP, Isatugo MK, Sawaki L, Fisberg M (1993) Anthropometric nutritional assessment of critically ill hospitalized children. Rev Paul Med 111: 309-313. Link: https://goo.gl/YGRxQP

26. Ferreira HS, França AOS (2002) Evolution of nutritional status in hospitalized children. J Pediatr (Rio J) 78: 491-496. Link: https://goo.gl/zqPFJA

27. Souba WW (1997) Nutritional support. Drug Ther 336: 41-48. Link: https://goo.gl/9bsXnT

28. Tienboon P (2002) Nutritional problems of hospitalized children in a developing country: Thailand. Asia Pacific J Clin Nutr 11: 258-262. Link: https://goo.gl/FkRtWw

29. Weisstaub G, Araya M (2008) Acute malnutrition in Latin America: the challenge of ending avoidable deaths. J Pediatr Gastroenterol Nutr 47: S10-14. Link: https://goo.gl/dlmNZS

30. Caulfield LE, de Onis M, Blössner M, Black RE (2004) Undernutrition as an underlying cause of child deaths associated with diarrhea, pneumonia, malaria, and measles. Am J Clin Nutr 80: 193-198. Link: https://goo.gl/aEa5xL

31. Huysentruyt K, Alliet P, Muyshont L, Devreker T, Bontems P, et al. (2013) Hospital-related undernutrition in children. Still an often unrecognized and undertreated problem. Acta Paediatr 102: e460-466.

32. Waitzberg DL, Caiaffa WT, Correia MI (2001) Hospital malnutrition: the Brazilian national survey (IBRANUTRI): a study of 4000 patients. Nutrition 17: 573-580. Link: https://goo.gl/uUk8Gv

33. Joosten KF, Zwart H, Hop WC, Hulst JM (2010) National malnutrition screening days in hospitalised children in the Netherlands. Arch Dis Child 95: 141-145. Link: https://goo.gl/G2Qv5q

34. Maitland K, Berkley JA, Shebbe M, Peshu N, English M, et al. (2006) Children with severe malnutrition: Can those at highest risk of death be identified with the WHO protocol? PLoS Med 3: e500. Link: https://goo.gl/7IouMX

35. Özer N, Urgancı N, Usta A, Kayaalp N (2001) Hastanede yatan çocuklarda malnutrisyon durumunun değerlendirilmesi. T Klin J Pediatr 10: 133-138. Link: https://goo.gl/IXyaOZ

36. Genel F, Atlıhan F, Bak M, Targan Ş, Paytoncu Ş, et al. (1997) Hastanede yatan olgularda malnutrisyon ve anemi prevalansı. T Klin J Pediatr. 6: 173-177. Link: https://goo.gl/LGnvBs

37. Tutar E, Boran P, Öktem S, Tokuç G, Çalışkan B (2012) Malnutrition in hospitalized pediatric patients: a comparison of the national Turkish and World Health Organization (WHO) Child Growth Standards. Marmara Med J 25: 128-132. Link: https://goo.gl/oHjKo1

38. Lek N, Hughes IA (2009) Opportunistic growth measurements are not frequently done in hospital. Arch Dis Child 94: 702-704. Link: https://goo.gl/lZSvBk

39. Hartman C, Shamir R, Hecht C, Koletzko B (2012) Malnutrition screening tools for hospitalized children. Curr Opin Clin Nutr Metab Care 15: 303-309. Link:https://goo.gl/rLJQtI

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